Docket No.: 60154.302001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	**TSAI, John C.**		
Application No.:	**10/053,508**	Group No.:	**2877**
Filed:	**1/10/2001**	Examiner:	**LYONS, Michael A.**
For:	**ROTATION AND TRANSLATION MEASUREMENT**		

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APPEAL BRIEF (37 C.F.R. § 41.31)

This brief is in furtherance of the Notice of Appeal, filed in this case herewith.

The fees required under § 41.20, and any required petition for extension of time for filing this brief and fees there for, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

Certificate of Mailing (37 CFR 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313.

2/1/2006
(date)

Patricia Beil
(Signature of Patricia Beilmann)

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(1)):

The final page of this brief bears the registered practitioner's signature.

I REAL PARTY IN INTEREST -- (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest in this appeal is Excel Precision Corporation, a California corporation of 3255 Scott Boulevard, Building 1, Suite 101, Santa Clara, California 95054, which is assignee of the entire right, title and interest to the invention in the United States and in all foreign countries.

II RELATED APPEALS AND INTERFERENCES -- (37 C.F.R. § 41.37(c)(1)(ii))

With respect to other appeals or interferences which may be related to, that will directly affect, or be directly affected by or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III STATUS OF CLAIMS -- (37 C.F.R. § 41.37(c)(1)(iii))

The status of the claims in this application are:

A. TOTAL NUMBER OF CLAIMS IN THE APPLICATION

Claims in the application are: 1-20

B. STATUS OF ALL OF THE CLAIMS

1. Claims rejected: 1-20
2. Claims allowed or confirmed: NONE
3. Claims withdrawn from consideration: NONE
4. Claims objected to: NONE
5. Claims canceled: NONE
6. Accordingly, the pending claims are: 1-20

C. CLAIMS ON APPEAL

The claims on appeal are: 1-20

IV STATUS OF AMENDMENTS -- (37 C.F.R. § 41.37(c)(1)(iv))

All amendments are understood to have been entered.

V SUMMARY OF CLAIMED SUBJECT MATTER -- (37 C.F.R. § 41.37(c)(1)(v))

The present application is a continuation-in-part of two prior applications, now issued as U.S. Pat. No. 5,991,112 and 6,316,779. The first of these disclosed and claimed phase sensitive detection. The latter disclosed and claimed a position determining system (PSD 100) that is useful for simpler rotation and translation measurement. As such, FIG. 1-9 and the text of the present application up to pg. 14, ln. 21 are largely background.

The presently claimed invention is best represented by FIG. 10, where a multiple parameters measurement system (MPMS 300) is depicted in use to measure target movement in up to five degrees of freedom (see. e.g., pg. 15, ln. 20 through pg. 16, ln. 2). A light source (302), such as a laser, provides a light beam (304) used by two optical channels. The optical channels each include an interferometer (310), a beam splitter (312), a retroreflector (314) (i.e., a reflective target), a detector (316), and a receiver (318).

The interferometers (310) receive portions of the light beam (304) and create respective reference beams and measurement beams (320). The reference beams in the embodiment in FIG. 10 stay entirely within the interferometers (310). In contrast, the measurement beams (320) exit the interferometers (310) and travel onward to and are reflected back by the retroreflectors (314).

FIG. 10 shows the measurement beams (320) passing through the beam splitters (312) <u>before</u> traveling to the retroreflectors (314), but this is optional and it is a simple matter for one skilled in the art to construct alternate embodiments where this is not the case. What is important here is that, <u>after</u> being reflected back, the measurement beams (320) enter the beam splitters (312) and are then each respectively split into first and second portions.

The first portions of the returning measurement beams (320) are detected by the detectors (316) to create respective detector signals. The detectors (316) are preferably position sensitive types, such as quad-cell photodiodes (see e.g., pg. 14, ln. 28-30).

The second portions split of the returning measurement beams (320) reenter the their respective interferometers (310), where they interferingly combine with the reference beams to produce result beams having beat frequencies.

The receivers (318) sense the respective result beams to produce receiver signals beat frequencies proportional to the speed of displacement of the retroreflectors (314). The receivers (318) are preferably precision light-intensity sensing devices, such as single cell photodiodes.

The detector signals thus are representative of any lateral position in of the retroreflectors (314), and the receiver signals are representative of the any displacement changes of the retroreflectors (314). In particular, by processing the two detector signals and the two receiver signals collectively all of simple displacement (X-axis movement), simple vertical or horizontal translation (Y-axis or Z-axis movement), yaw (rotation about the Y-axis), and roll (rotation about the Z-axis) can be determined. The MPMS (300) accordingly is capable of measurement of a target movable in five degrees of freedom. Only pitch (rotation about the X-axis) is difficult with the MPMS (300) shown in FIG. 10, but an additional channel can be added to also measure it.

The independent claims are claim 1 (apparatus), claim 12 (means-plus-function apparatus), and claim 17 (method). These all conform with the above description. Dependant claims 11, 16 and 20 recite an important additional feature termed "phase sensitive detection."

FIG. 4-5 depict and pg. 8, ln. 16-27 and pg. 9, ln. 15 through pg. 11, ln. 9 discuss phase sensitive detection. Briefly, this technique modulates a light beam (124) with a modulation signal (142), e.g., the 30 kHz trapezoidal waveform with linear zero-transition characteristics shown in FIG. 5. The light beam (124) is then used it in the manner described above, to produce raw signals (150) (e.g., the detector and receiver signals of the MPMS (300) in FIG. 10).

Various electronic signal processing on the raw signals (150) is performed based on the modulation signal (142). For example, differential processing removes DC elements from the signals, as might typically be caused by thermal or other component drift. Then frequency-based processing is used to remove undesirable AC elements from the signals, as might typically be added to the light beams by ambient light or added to the raw detector and receiver signals by nearby power loads or noise from florescent lighting. The end result of phase sensitive detection is that the detector and receiver signals are rendered very pure and error-free.

The label "phase sensitive detection" is used because this technique permits resolving extremely small changes in phase. In optical interferometric measurement, the use of phase sensitive detection permits resolving movements much smaller than a single wavelength of the light being used. To the best of Appellant's knowledge, its now issued U.S. Pat. No. 5,991,112

(from a parent application of the present one) is the first teaching of phase sensitive detection in the optical arts.

VI GROUND OF REJECTION TO BE REVIEWED ON APPEAL
(37 C.F.R. § 41.37(c)(1)(vi))

Whether claims 1-20 are unpatentable under 35 U.S.C. § 103(a), over Thiel et al. , U.S. Patent No. 5,521,704 (hereinafter Thiel), in view of Lau et al., U.S. Patent No. 4,714,339 (hereinafter Lau).

VII ARGUMENT -- (37 C.F.R. § 41.37(c)(1)(vii))

All of the rejections are made under 35 U.S.C. § 103(a), for which MPEP § 2142 provides us with guidance:

> *To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.* (cites omitted)

Appellant urges that no prima facie case for obviousness based on a combination of Thiel and Lau has been made because the present rejection fails to meet all three of these criteria.

VII(A) ARGUMENTS—THE § 103 REJECTION OF CLAIMS 1-10

VII(A)(i) ARGUMENTS—THIEL AND LAU WHEN COMBINED DO NOT TEACH OR REASONABLY SUGGEST ALL THE CLAIM LIMITATIONS

Claim 1 recites "*two optical channels ... each including ... an interferometer* [two total, only]*; ... a beam splitter ...; a detector; ... and a receiver.*" The Examiner's arguments in the Action dated 11/09/2005 (the "11/09/2005 Action") about which of these elements are taught or suggested by Thiel and which by Lau are very confused.

The Examiner first characterizes Thiel as having "*two optical channels 3 and 4*" (pg. 2 starting at the last paragraph (¶) and ending on pg. 3 of the 11/09/2005 Action). This is error. Thiel has two "*measuring interferometers 3, 4*" (col. 5, ln. 46-58, see e.g., Fig. 1) and it only works by virtue of having both of these held in fixed spatial relationship. Thiel thus actually teaches a single channel. (See e.g., col. 5, ln. 46-51; col. 5, ln. 65 to col. 6, ln. 6; and Fig. 1.)

The Examiner summarizes the sets of elements relied on from Thiel as each "*all acting as an interferometer*" (pg. 2 last ¶, and ending on pg. 3 of the 11/09/2005 Action) – and then takes nothing else from Thiel. The current rejections are thus apparently based on Thiel teaching two interferometers, each in a different "channel," and nothing more.

Oddly, the Examiner next argues that "*Thiel ... fails to disclose an interferometer for generating the reference and measurement beams* [of claim 1]," that "*Lau (Fig. 6 and 7) discloses ... an optical channel* [singular] *including an interferometer*," and that "*it would have been obvious to ... add the explicit interferometer to each optical channel of the device of Thiel as per Lau*" (pg. 3, in full ¶ 1, 2, and 3 respectively of the 11/09/2005 Action). So the Examiner is here apparently arguing that the rejection is based on the two interferometers of Thiel plus one or two of the single-channel interferometers of Lau. The problem with this combination is that it includes 3 or 4 interferometers, which are more than Appellant's claims recite. The Examiner thus effectively appears to be arguing that the combination of Thiel and Lau requires more key elements than the claimed invention.

The Examiner has held that Lau teaches equivalents to the beam splitter, detector, and receiver in each channel of claim 1 (pg. 3, full ¶ 3 of the 11/09/2005 Action). We agree that Lau teaches these elements, but not that this is determinative. The Examiner has stated that "*Lau, however, only discloses a single channel in the device*" (pg. 3, full ¶ 1 of the Action dated 03/08/2005). This, however, cannot be reconciled with Thiel or the claimed invention.

Furthermore, patentability should also considered here in view of what is omitted. Lau teaches that its single channel invention requires a "*tracking mirror 28 ... under servo control* [by] *the x-axis output* [and the Y-axis output] *of the photodiode 128* [putative detector equivalent]" (Fig. 6 and 7). Thus, the Examiner is taking a few parts of Lau, and ignoring others that are critical to its operability and that would undermine any operability in Thiel, and then doubling the quantity of those parts taken, and combining them with redundant parts of Thiel.

VII(A)(ii) ARGUMENTS—COMBINING THIEL AND LAU WOULD NOT HAVE A REASONABLE EXPECTATION OF SUCCESS

Thiel performs distance measurement (i.e., 1-axis measurement, specifically X-axis measurement with respect to its figures). In contrast, Lau performs three and five axis measurement, but specifically states that its (relevant) embodiment in FIG. 6-7 is "*only to measure ... position in the XYZ coordinate system*" (i.e., 3-axis measurement)(col. 8, ln. 42-44). What is missing in this argument is an explanation of how Thiel's X-axis system can be combined with Lau's XYZ axis system to arrive at Applicant's 5-axis measurement invention (XYZ + at least two of yaw, roll, and pitch).

Thiel performs its measurement by use of a tunable laser (col. 5, ln. 41-42) and special beam modulation (col. 6, ln. 39-40). In contrast, Lau uses a fixed frequency laser (see e.g., col. 4, ln. 15-24), and its beam is unmodulated. If Lau's laser was employed with the teachings of Thiel the combination would not work, and if Thiel's laser was employed with the teachings of Lau that combination also would not work.

Thiel performs absolute distance measurement by use of its special tunable laser and beam modulation (col. 5, ln. 41-46), and by requiring that its two interferometers be separated by a known fixed distance (L_{Ref})(col. 5, ln. 46-51). In contrast, Lau is only capable of absolute position measurement based on an initial absolute distance calibration between its tracking mirror and its target (col. 4, ln. 4-9). The relevant embodiment of Lau (FIG. 6-7) uses a single interferometer. If Lau's servo controlled tracking mirror and calibrated initial mirror-to-target distance were combined with the teachings of Thiel the combination would not work (e.g., for lack of a second interferometer), and if Thiel's two interferometers separated by a known fixed distance were combined with the teachings of Lau the result also would not work (e.g., for lack of servo control of anything). None of these are limitations of the claimed invention.

VII(A)(iii) ARGUMENTS—THERE IS NO SUGGESTION OR MOTIVATION TO COMBINE THIEL AND LAU

In an apparent effort to address "*suggestion or motivation*" for the combination, the Examiner has argued that:

> *... it would have been obvious ... to add the explicit interferometer to each optical channel of the device of Thiel as per Lau, the motivation for this ... being that the addition of the explicit interferometer will allow for easy detection of a stand-alone measurement and an interfered measurement/reference beam so that multiple, distinct measurements can be more easily obtained than by the detection of a pair of interfered beams as currently disclosed by Thiel.* (pg. 3, full ¶ 3 of the 11/09/2005 Action)

First, this is merely unsupported conjecture. It cites no support in the references themselves.

Next, much of this is nonsense. Neither Thiel or Lau uses the term "*explicit interferometer*," it is not a term of art that we can find any definition of, and the Examiner has not seen fit to explain what it means. As discussed above, the Examiner first relied on Thiel only for its teaching of interferometers and (wrongly) of two channels. The Examiner then relied on Lau for its teaching of all of the other elements of a single channel plus teaching of an interferometer that works with these. And now the Examiner seems to be arguing that combining this mysterious "*explicit interferometer*" from Lau into each section of Thiel would be equivalent to the claimed invention.

Similarly, "*allow*[ing] *for easy detection of a stand-alone measurement*" states nothing. All of Thiel, Lau, the claimed invention, and most art in this field do this. Furthermore, "[providing] *multiple, distinct measurements*" is not usefully descriptive of any of Thiel, Lau, or the claimed invention. The ease of measurement, the quantity of measurements taken, and stand-alone measurability are not relevant. Thiel performs absolute X-axis distance measurement (Fig. 1); Lau's relevant embodiment performs XYZ-axis measurement (Fig. 6-7); and the claimed invention performs 5-axis measurement (XYZ + at least two of yaw, roll, and pitch).

With respect to dependent claims 2-10, Appellant relies on the arguments above for the allowability of parent claim 1.

VII(B) ARGUMENTS—THE § 103 REJECTION OF CLAIM 11

Claim 11 includes the limitations of claims 1 and 10, and further recites that the "*light source includes a modulator*" and that the "*processing system ... processes ... with phase sensitive detection.*"

With respect to this the Examiner's arguments have been circular. At pg. 4, last ¶ and extending onto pg. 5 the 11/09/2005 Action states the same as the 03/08/2005 Action, when Thiel was first cited.

The second, third, and fourth Actions thus all state "*the light source of Thiel is tunable, and therefore able to be modulated to produce a light beam with a modulation characteristic.*" But as a technical statement, this is nonsense. It is well known in the art that tuning and modulation are not the same. A light beam may be tuned with respect to its wavelength and yet have no modulation, and a light beam may be modulated yet not be tuned with respect to any desired central wavelength.

In any case, Appellant pointed out and conceded two Responses ago that Thiel teaches the use of a tunable laser (col. 5, ln. 41-42) and of special beam modulation (col. 6, ln. 39-40), and Appellant urged that this is still not determinative. Yet despite these repeated attempts in Responses to elicit meaningful discussion, the Examiner has simply never stated any arguments that the special beam modulation of Thiel would be equivalent to that needed for the phase sensitive detection of claim 11 or that its special modulation could be combined with Lau and still have a workable combination.

In fact, the special beam modulation of Thiel could not be used for phase sensitive detection. It is used to keep Thiel's laser in a "*mode-jump-free range*" and phase changes in it are used "*until a new order of interference is passed over*" to measure distance (col. 6, ln. 39-65). In contrast, Appellant's phase sensitive detection does exactly what the label implies, it facilitates detection (see e.g., FIG. 4-5 and pg. 9, ln. 15 through pg. 11, ln. 9).

The Actions continue:

> *Additionally, although the computer of Lau fails to explicitly disclose a phase sensitive detection, or a demodulator for demodulating a modulated signal, it would have been obvious to one of ordinary skill to make detection phase sensitive, as Official Notice is taken as to making demodulated measurements of a modulated signal and phase related measurements in interferometery.*

Replying to the 03/08/2005 Action, when Thiel was first cited, Appellant's Response dated 05/18/2005 specifically addressed this, stating:

> *With respect to the taking of Official Notice, it is unclear from the Action what a "demodulated measurement" is in the present context. Accordingly, since the technical line of reasoning underlying this is not clear and unmistakable (MPEP 2144.03(B)), we respectfully challenge the Office to support this finding with adequate evidence (MPEP 2144.03(C)). With respect to the fact that there*

> *are "phase related measurements in interferometery," we* [accept] *this but urge that it is irrelevant to phase sensitive detection as it relates to the claimed invention. As can be appreciated from review of the portions of Applicant's specification noted ... phase sensitive detection is used for electrical signal processing by the invention that is coincidental to the underlying optical phase interference between two light beams also being used by the invention.*

Interestingly, the Response to Arguments at pg. 5, last ¶ in the 06/17/2005 Action then stated:

> *... while the examiner appreciates the pointing out of the modulation disclosure overlooked in the Thiel reference, the Official Notice that was taken with regards to claims 11, 16, and 19-20 stands, particularly in light of US Pat. No. 3,738,754 to Marcy (Fig. 1 and relevant disclosure) in response to the challenge of support with adequate evidence as to the Official Notice for these claims.*

And Appellant's 07/13/2005 Response directly addressed this, stating:

> *Respectfully, this merely reiterates that the Examiner is taking Official Notice. It does not, as was specifically requested in the last response, "support [such] finding with adequate evidence (MPEP 2144.03(C))" and it does not rectify that "the technical line of reasoning underlying [the application of such] is not clear and unmistakable (MPEP 2144.03(B))." If the Examiner wishes to argue Marcy, then we respectfully call upon him to substitute it for his challenged Official Notice and to then argue Marcy with requisite specificity to provide Applicant a reasonable opportunity to reply.*

U.S. Pat. No. 3,738,754 to Marcy in Fig. 1, the text describing it, and everywhere else therein does not teach or reasonably suggest phase sensitive detection. Marcy does not apply a modulating signal to a light source producing a light beam, it applies an oscillator signal to "*piezoelectric ceramic elements 14*" behind a "*reference mirror 5*" (col. 3, 50-58 and FIG. 1). Marcy terms this combination a "*modulated phase-shift element*" (*id.*), which has perhaps been misunderstood by the Examiner. Marcy correctly terms what it does as "*optical length modulation*" (e.g., Abstract) and, as such, it is a much cruder mechanical-based technique than the electronics-based phase sensitive detection used by Appellant. A lot more can be said about Marcy but will not be here, because the Examiner has yet to actually base any rejection on it.

Finally, the 11/09/2005 Action (the last), fails to mention Marcy, but like the previous Actions repeats the statement "*the light source of Thiel is tunable, and therefore able to be modulated ... Additionally, ... Lau fails to explicitly disclose ... it would have been obvious ... as Official Notice is taken ....*" This last Action does not even acknowledge what was previously admitted to be present in Thiel and again has an unsupported taking of Official Notice. Appellant here especially urges that no prima facie case for obviousness has been stated by the Examiner.

VII(C) ARGUMENTS—THE § 103 REJECTION OF CLAIMS 12-15

Claim 12 recites "*two optical channels ... each including ... an interferometer means; ... a splitter means ...; detector means; ... and receiver means.*" Aside from reciting such means plus functions, claims 12-15 are essentially equivalent to claims 1-10 and the Examiner has not provided any separate arguments. Appellant accepts this and urges that claims 12-15 should be allowable for at least the reasons discussed above in Section VII(A).

VII(D) ARGUMENTS—THE § 103 REJECTION OF CLAIM 16

Aside from reciting means plus functions, claim 16 is essentially equivalent to claim 11 and the Examiner has not provided any separate arguments for it either. Appellant accepts this and urges that claim 16 should be allowable for at least the reasons discussed above in Section VII(B).

VII(E) ARGUMENTS—THE § 103 REJECTION OF CLAIMS 17-19

Claim 17 recites the steps of "*... for ... two optical channels ... in each ... receiving a ... light beam and providing therefrom a reference beam and a measurement beam; ... receiving ... said measurement beam and providing therefrom a first portion and a second portion ...; producing a detector signal; ... and producing a receiver signal.*" Aside from reciting steps, claims 17-19 are essentially the method of claims 1-10 or claims 12-15. the Examiner has not provided any separate arguments for claims 17-19. Appellant accepts this and urges that claims 17-19 should be allowable for at least the reasons discussed above in Section VII(A).

VII(F) ARGUMENTS—THE § 103 REJECTION OF CLAIM 20

Aside from reciting a method step, claim 20 is essentially equivalent to claims 11 and 16 and the Examiner has not provided any separate arguments for it either. Appellant accepts this and urges that claim 16 should be allowable for at least the reasons discussed above in Section VII(B).

VIII CLAIMS APPENDIX -- (37 C.F.R. § 41.37(c)(1)(viii))

The text of the claims involved in the appeal are:

1. A measuring apparatus, comprising:

a light source for producing light beams for at least two optical channels; and

said optical channels each including:

an interferometer for receiving one said light beam and providing therefrom a reference beam and a measurement beam;

a reflective target for receiving and redirecting said measurement beam;

a beam splitter for receiving the redirected said measurement beam and providing therefrom a first portion and a second portion;

a detector for sensing said first portion and producing a detector signal based thereon;

said interferometer further for receiving said second portion of said measurement beam and combining said second portion with said reference beam to form a result beam; and

a receiver for sensing said result beam and producing a receiver signal based thereon.

2. The measuring apparatus of claim 1, wherein said light source includes a laser diode.

3. The measuring apparatus of claim 1, wherein said light source includes a single light producing unit, a splitter and a bender for producing said light beams.

4. The measuring apparatus of claim 1, wherein said light source includes a plurality of light producing units, one per each said optical channel.

5. The measuring apparatus of claim 1, wherein said interferometers and said beam splitters employ polarization.

6. The measuring apparatus of claim 1, wherein said reflective targets are retroreflectors.

7. The measuring apparatus of claim 1, wherein said detectors are position sensitive detectors.

8. The measuring apparatus of claim 1, wherein said detectors include at least on member of the set consisting of bi-cell photo diode units, quad-cell photo diode units, and photo diode arrays.

9. The measuring apparatus of claim 1, wherein said receivers include photo diodes.

10. The measuring apparatus of claim 1, further comprising:

a processing system for processing said detector signals and said receiver signals into position data suitable for communication to an external system.

11. The measuring apparatus of claim 10, wherein:

said light source includes a modulator to produce said light beams including a modulation characteristic; and

said processing system includes a demodulator and processes at least one of said detector signals and said receiver signals with phase sensitive detection.

12. A measuring apparatus, comprising:

means for producing light beams for at least two optical channels; and

said optical channels each including:

interferometer means for receiving one said light beam and providing therefrom a reference beam and a measurement beam;

means for receiving and redirecting said measurement beam;

splitter means for receiving the redirected said measurement beam and providing therefrom a first portion and a second portion;

detector means for sensing said first portion and producing a detector signal based thereon;

said interferometer means further for receiving said second portion of said measurement beam and combining said second portion with said reference beam to form a result beam; and

receiver means for sensing said result beam and producing a receiver signal based thereon.

13. The measuring apparatus of claim 12, wherein:

said means for producing light beams includes:

means for producing an initial beam;

means for splitting said initial beam into a first beam and at least one secondary beam; and

bender means for directing said secondary beams in parallel with said first beam, thereby producing said light beams for said at least two optical channels.

14. The measuring apparatus of claim 12, wherein:

said interferometers include means for polarizing said measurement beams; and

said splitter means includes means for separating with polarization, thereby permitting providing said first portions and said second portions of said measurement beams based on respective polarization characteristics.

15. The measuring apparatus of claim 12, further comprising:

processing means for processing said detector signals and said receiver signals into position data suitable for communication to an external system.

16. The measuring apparatus of claim 12, wherein:

said means for producing light beams includes modulating to produce said light beams including a modulation characteristic; and

said processing means includes demodulating means to permit processing at least one of said detector signals and said receiver signals with phase sensitive detection.

17. A method for measuring positional information about a target, the method comprising the steps of:

(a) producing light beams for at least two optical channels; and

in each said optical channel:

(b) receiving a said light beam and providing therefrom a reference beam and a measurement beam;

(c) receiving at and redirecting said measurement beam from the target;

(d) receiving the redirected said measurement beam and providing therefrom a first portion and a second portion;

(e) producing a detector signal based on said first portion;

(f) combining said second portion with said reference beam to form a result beam;

(g) producing a receiver signal based on said result beam; and

(h) processing said detector signals and said receiver signals into position data suitable for communication to an external system.

18. The method of claim 17, wherein:

said step (b) includes polarizing said measurement beams; and

said step (d) includes separating said first portions from said second portions based on polarization.

19. The method of claim 18, wherein:

said step (a) includes modulating with a frequency said light beams; and

said step (h) includes demodulating at least one of said detector signals and said receiver signals based on said frequency.

20. The method of claim 19, wherein said step (h) includes processing with phase sensitive detection.

IX EVIDENCE APPENDIX -- (37 C.F.R. § 41.37(c)(1)(ix))

None.

X RELATED PROCEEDINGS APPENDIX -- (37 C.F.R. § 41.37(c)(1)(x))

None.

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Respectfully Submitted,

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